

## CLAIMS

1     1. A detector device comprising:  
2         a sensor array configured to detect x-rays;  
3         an internal sync pulse source configured for flushing the sensor array;  
4         an internal clock configured for triggering the internal sync pulse source to  
5             generate an internal sync pulse;  
6         an external sync input configured for triggering the internal sync pulse source to  
7             generate the internal sync pulse;  
8         a ready signal output configured to indicate when the internal sync pulse is  
9             generated responsive to the internal clock and when the internal sync pulse  
10            can be generated responsive to the external sync input; and  
11         an input configured for initiating a data acquisition mode transition, the internal  
12            sync pulse being generated using the internal clock during at least part of  
13            the acquisition mode transition, the internal sync pulse being generated  
14            using the external sync input following to the data acquisition mode  
15            change.

1     2. The detector device of claim 1, wherein the acquisition mode transition includes a  
2         change in data acquisition frame rate.

1     3. The detector device of claim 1, wherein internal sync pulse is generated using the  
2         external sync input prior to the data acquisition mode transition.

1 4. A detector device comprising:  
2 an internal clock;  
3 a sensor array configured to acquire data in a first data acquisition mode and to  
4 acquire data in a second data acquisition mode;  
5 an input configured for initiating a data acquisition mode change between the first  
6 data acquisition mode and the second data acquisition mode; and  
7 an electronic circuit configured for flushing the sensor array responsive to the  
8 internal clock during at least part of the acquisition mode change and  
9 configured for flushing the sensor array responsive to an external signal  
10 prior to the data acquisition mode change.

1 5. The detector device of claim 4, wherein the data acquisition mode change is  
2 performed in less than four data acquisition frames.

1 6. The detector device of claim 4, wherein the sensor array is configured to detect x-rays.

1 7. A control system comprising:  
2 an interface configured for communication with an x-ray detector device; and  
3 computer instructions configured for communicating through the interface, the  
4 communication including  
5 an output signal configured to control frame start times of the x-ray  
6 detector device,  
7 an output signal configured to initiate a data acquisition mode transition of  
8 the x-ray detector device,

9                   an input signal, from the detector device, configured to indicate whether  
10                   the frame start times are dependent or independent of the output  
11                   signal configured to control frame start times.

1     8. The control system of claim 7, wherein the x-ray detector device includes an array of  
2           integrating sensors requiring flushing.

1     9. The control system of claim 7, wherein the computer instructions are configured to  
2           control the x-ray detector device in a master-slave relationship prior to the data  
3           acquisition mode transition, and to reestablish the master-slave relationship  
4           following the data acquisition mode transition.

1     10. An x-ray system comprising:  
2           a detector device including  
3                an array of sensors configured to detect x-rays,  
4                an output configured to indicate when an external sync input can be used  
5                to trigger internal sync pulses for indicating frame starts, and  
6                an internal circuit configured to flush the array of sensors responsive to an  
7                internal clock, the internal clock configured to trigger the internal  
8                sync pulses during at least part of a data acquisition mode change;  
9                and  
10           a control system including  
11               data storage configured to store x-ray data generated using the detector  
12               device,

13 computer instructions configured to initiate the data acquisition mode  
14 change,  
15 an output configured to provide the external sync input to the detector  
16 device,  
17 an input configured to monitor the output of the detector device and detect  
18 the completion of the data acquisition mode change.

1 11. The x-ray system of claim 10, further including a data conduit configured for  
2 communicating signals from the detector device to the control system.

1 12. The x-ray system of claim 10, further including an x-ray source and computer  
2 instructions configured to activate the x-ray source responsive to the frame starts.

1 13. The x-ray system of claim 10, further including an x-ray source and mechanical  
2 control configured to move the x-ray source.

1 14. The x-ray system of claim 10, wherein the computer instructions are further  
2 configured to change a master-slave relationship between the detector device and  
3 the control system during the acquisition mode change.

1 15. A method of operating an x-ray system, the method comprising:  
2 sending a plurality of first frame-start signals to a detector device, the first frame-  
3 start signals configured to determine frame starts in a first acquisition  
4 mode;

5        sending a second signal to the detector device, the second signal configured to  
6                initiate a change in acquisition mode from the first acquisition mode to a  
7                second acquisition mode;  
8        receiving a third signal from the detector device, the third signal configured to  
9                indicate that the change in acquisition mode has begun and that a clock  
10               internal to the detector device is being used to flush a sensor array of the  
11               detector device;  
12        receiving a forth signal from the detector device, the forth signal indicating that  
13               the detector device is prepared to receive second frame-start signals; and  
14        sending a plurality of second frame-start signals to the detector device, the second  
15               frame-start signals configured to determine frame starts in a second  
16               acquisition mode.

1        16. The method of claim 15, wherein the first frame starts determine a first frame rate  
2               and the second frame starts determine a second frame rate.

1        17. A method of operating detector device, the method comprising:  
2               receiving, at the detector device, a prepare signal from a control system, the  
3               prepare signal configured to facilitate a change in acquisition mode from a  
4               first data acquisition mode to a second data acquisition mode;  
5        sending, from the detector device, a first signal to the control system, the first  
6               signal configured to indicate that generation of internal sync pulses is being  
7               triggered using a clock internal to the detector device;

8 flushing one or more x-ray sensor using the internal sync pulses generated  
9 responsive to the clock, the one or more x-ray sensor being included in the  
10 detector device;  
11 sending a second signal, from the detector device, to the control system, the  
12 second signal configured to indicate that the detector device is prepared to  
13 receive frame-start signals;  
14 receiving the frame-start signals at the detector device, from the control system;  
15 using the frame-start signals, instead of the clock, to trigger generation of the  
16 internal sync pulses; and  
17 flushing the one or more x-ray sensor using the internal sync pulses generated  
18 responsive to the frame-start signals.

1 18. The method of claim 17, further including  
2 generating further internal sync pulses responsive to frame-start signals received  
3 from the control system prior to receiving the prepare signal, and  
4 flushing the one or more x-ray sensor using the internal sync pulses generated to  
5 the frame-start signals received from the control system prior to receiving  
6 the prepare signal.

1 19. The method of claim 17, further including receiving a command to change a frame  
2 rate, from the control system.

1 20. An x-ray system comprising:  
2 means for notifying a detector device of a pending change in data acquisition  
3 mode;

4 means for generating an internal signal, the internal signal configured for assuring  
5 that x-ray sensors are flushed during at least part of the change in data  
6 acquisition mode, internal to the detector device;  
7 means for receiving an external signal, the external signal configured for assuring  
8 that x-ray sensors are flushed prior to or following the change in data  
9 acquisition mode; and  
10 means for switching between use of the internal signal and external signal, for  
11 assuring that the x-ray sensors are flushed.